PUGET SOUNDKEEPER®

Date: April 20, 2021

To: US EPA Region 10
Region10@epa.gov

Re: Comments on Proposed Explanation of Significant Differences (ESD) Draft Document (January, 2021) for the Lower Duwamish Waterway Superfund Site (LDW)

Protecting and Preserving Puget Sound

130 Nickerson Street, Suite 107
Seattle, WA 98109

P 206.297.7002
F 206.297.0409

www.pugetsoundkeeper.org

To Whom it May Concern:

Thank you for considering these comments on the January 2021 ESD proposed changes to the LDW Record of Decision (ROD) issued in 2014.

Puget Soundkeeper submits these comments on behalf of over 7,000 members, volunteers and supporters. Soundkeeper is a member of the Duwamish River Cleanup Coalition (DRCC) Technical Advisory Group (TAG). In these comments, Soundkeeper aims to affirm, echo and amplify the concerns expressed by DRCC.

Soundkeeper, too, is concerned about inconsistency in regulating the polynuclear aromatic hydrocarbon (PAH) compound benzo(a)pyrene (B(a)P). We are concerned about a number of issues, including inconsistent findings from EPA, and specifically the uncertainty regarding the overall toxicity and carcinogenicity of B(a)P. According to our experts, these issues, coupled with uncertainty regarding using B(a)P as a surrogate compound to address health risk and toxicity from other carcinogenic polycyclic aromatic hydrocarbons (cPAHs), is troublesome and problematic.

We have reviewed the proposal for the sweeping increases to B(a)P RAL concentrations for the Duwamish River, including those related to the upper 10 cm, upper 45 cm, and protective levels for clamming and beach play. Following is a discussion and rationale for our strong technical concerns and objections regarding raising the RAL values in sediment for B(a)P.

Need for additional modeling and verification. EPA should conduct additional modeling and backup testing for cPAH water column concentrations with the revised sediment remedial action levels (RALs) before proceeding and finalizing revised cPAH sediment cleanup levels. This additional work is essential to ensure safe clam and fish consumption in the future. CPAHs are stable, non-polar, hydrophobic hydrocarbons, and therefore equilibrium partitioning (EqP) modeling kinetics are sound can be used to estimate toxicity-based RALs or other regulations. This is a widely accepted practice. As an example, EPA's national chronic national water quality standard for B(a)P is 0.014 µg/l (ppb), and if EqP assumptions are used to estimate sediment quality values using this modeling approach, sediment quality guidelines or RALs for B(a)P, would be far more restrictive, as would be expected for

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a carcinogenic PAH such as B(a)P. For stable compounds such as BaP specifically and cPAHs in general, surface water and sediment quality standards should be internally consistent.

BaP is both highly toxic and highly ecotoxic in aquatic and marine environments. Although the carcinogenicity of B(a)P is arguably the most serious concern, abundant recent ecotoxicological research has shown that B(a)P is more toxic to a variety of marine and freshwater aquatic invertebrates in fish than originally thought. Recent research from NOAA's Northwest Fisheries Science Center (NWFSC) has released a flurry of peer-reviewed publications documenting sublethal and potentially long-term effects of BaP and other PAH in the aquatic and marine environment (**see examples in cited references below). Using a widely recognized national database, NOAA's National Status & Trends program (e.g. 1999), an abundance of peer-reviewed sediment quality guidelines (SQGs) have been derived based on voluminous toxicity studies over the course of many years.

As an example, the Effects Range-Low (ER-L) concentration for B(a)P is 430 ppb (equivalent to a No Effects Concentration on a dose-response curve). This is a fraction of the elevated RAL values for sediments that would be protective of human health using a carcinogenicity endpoint (e.g. ESD-proposed range of 380 to 2,800 ppb for the upper 10 cm, or 150 to 1,100 ppb for the upper 45 cm). Cancer endpoints are normally far more sensitive and therefore far lower than ecotoxicity-based endpoints, and yet these NS&T values are uniformly stricter and more protective than the proposed RAL values in the ESD!

BaP as a surrogate for other ecotoxic and carcinogenic cPAHs. Other similar non-polar, hydrophobic high molecular weight PAHs are very similar to B(a)P and are both ecotoxic and carcinogenic (they are also cPAHs). They all have comparable ER-L values (as published by NOAA's National Status & Trends program). Key examples include chrysene (384 ppb), Benz(a)anthracene (261 ppb), dibenz(a,h)anthracene (63.4 ppb), and fluorene (19 ppb). In other words, it isn't appropriate to simply use B(a)P as a blanket surrogate for each of these other toxic homologs, especially when the toxicity and ecotoxicity characteristics have been well studied and documented.

B(a)P almost never occurs in a vacuum, but rather is almost always accompanied by a complex mixture of toxic, pyrogenic (combustion-by product) PAH homologs that may be at least as toxic as B(a)P itself. Several of these toxic homologs are toxic in their own right, and together they can combine to deliver a toxic exposure and dose either to humans, aquatic organisms, and/or both (e.g. in the Duwamish R watershed). There are updated toxicity data on both B(a)P and other cPAHs to underscore that these proposed RAL and other numbers are under protective. Among the least

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defensible of the proposed values are the clam tissues concentrations (~1,100 ppb), which are not protective of human health and are probably not protective of the clams themselves. We need to be protective of both types of exposures.

Updated carcinogenicity data for B(a)P. Concerning the carcinogenicity of B(a)P, we have reviewed UW's *Toxicological Review of Benzo(a)Pyrene* dated January, 2017. The review explains that EPA was over-aggressive in eliminating many of the 15 research studies that would otherwise be acceptable. The remaining studies that EPA did not eliminate indicated that B(a)P is about seven times less toxic than the previous standard used by EPA, while an excluded lifetime study indicated that B(a)P is about 1.5 times more toxic than the previous standard (along with other studies, which also indicated a higher cancer risk than EPA's new proposed cancer risk factor for B(a)P). UW scientists in this report expressed concern that inconsistent results across all studies indicates a high level of uncertainty concerning the carcinogenicity potential of B(a)P.

In summary, raising these RAL values by a significant percentage to save only a relatively small amount of money in remediation is counterproductive and antithetical to EPA's goals of setting sediment, biological tissue, and water quality goals to be protective for all beneficial uses in the Duwamish River watershed. For example, under EPA's own 2005 *Guidelines for Carcinogen Risk Assessment*, B(a)P is classified as "carcinogenic to humans" based on strong and consistent evidence in animals and humans. The evidence includes an extensive number of studies demonstrating carcinogenicity in multiple animal species exposed via all routes of administration and increased cancer risks, particularly in the lung and skin, in humans exposed to different PAH mixtures containing B(a)P. In addition, mechanistic studies have been conducted which provide strong supporting evidence that links the metabolism of B(a)P to DNA-reactive agents with key mutational events in genes that can lead to tumor development. These events include formation of specific DNA adducts and characteristic mutations in oncogenes and tumor suppressor genes that have been observed in humans exposed to PAH mixtures. This combination of human, animal, and mechanistic evidence provides a strong basis for EPA's characterizing benzo[a]pyrene as carcinogenic to humans.

In light of the foregoing evidence and findings concerning the toxicity and carcinogenicity of B(a)P, there is no technical basis for raising cancer-based RALs for LDW sediments, and further, carcinogenity-based RAL values should not be *less* protective than ER-L or other sediment quality guidelines that are than ecotoxicity-based.

Therefore, Soundkeeper insists that the Duwamish River be recovered to standards that support healthful fishing and shell-fishing for future generations. Such a target is not out of reach, and should be held firmly throughout this process.

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Finally, it would be wholly unfair and inequitable to trade a .33% cleanup cost reduction for increased human health and ecological risks. The environmental justice communities that rely on the recovery of the Duwamish River deserve so much better. It is incumbent upon us all to demand health justice, especially for community members who have been historically marginalized, silenced and burdened disproportionately with the legacy pollutants that make it necessary to do this cleanup.

Sincerely,

Katelyn Kinn
Puget Soundkeeper Alliance

Allan Chartrand
Environmental Scientist
Chartrand Environmental LLC

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Peer-reviewed literature cited:

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